

In the Specification

Kindly replace paragraphs [0009] through [0012] with the following:

~~An object of the present invention is to solve these problems and~~It would therefore be advantageous to provide a multilayer structure excellent in the alcohol gasoline permeation-preventing properties, in interlayer adhesion, in low-temperature impact resistance and in heat resistance.

DISCLOSURE OF THE INVENTIONSUMMARY

~~As a result of intensive investigations to solve these problems, the present inventors have~~We found that a multilayer structure obtained by stacking a layer comprising a semi-aromatic polyamide having a specific structure and a layer comprising polyamide 11 and/or polyamide 12 ensures both the interlayer adhesion and the alcohol gasoline permeation-preventing property and satisfies various properties such as low-temperature impact resistance and heat resistance.

~~More specifically, the present invention relates to~~Thus, this disclosure relates to a multilayer structure comprising at least two or more layers including a layer (a) comprising (A) polyamide 11 and/or polyamide 12, and a layer (b) comprising (B) a polyamide (polyamide 9N) consisting of a dicarboxylic acid unit comprising a naphthalenedicarboxylic acid unit in a proportion of 50 mol% or more based on all dicarboxylic acid units and a diamine unit comprising a 1,9-nonanediamine and/or 2-methyl-1,8-octanediamine unit in a proportion of 60 mol% or more based on all diamine units.

Also, the ~~present invention~~disclosure relates to a multilayer structure comprising at least three or more layers including a layer (a) comprising (A) polyamide 11 and/or polyamide 12, a layer (b) comprising (B) a polyamide (polyamide 9N) consisting of a dicarboxylic acid unit comprising a naphthalenedicarboxylic acid unit in a proportion of 50 mol% or more based on all dicarboxylic acid units and a diamine unit comprising a 1,9-nonanediamine and/or 2-methyl-1,8-octanediamine unit in a proportion of 60 mol% or more based on all diamine units, and a layer (c) comprising (A) poly-

amide 11 and/or polyamide 12 or (C) polyamide 6.

Kindly replace paragraphs [0014] through [0016] with the following:

~~BEST MODE FOR CARRYING OUT THE INVENTION~~DETAILED DESCRIPTION

~~The present invention is described in detail below.~~

The (A) polyamide 11 ~~for use in the present invention~~ is representatively a polyamide having an acid amide bond (-CONH-), represented by the formula: $(-\text{CO}-(\text{CH}_2)_{10}-\text{NH}-)_n$, and this polyamide can be obtained by polymerizing 11-aminoundecanoic acid or undecanelactam. The polyamide 12 is representatively a polyamide having an acid amide bond (-CONH-), represented by the formula: $(-\text{CO}-(\text{CH}_2)_{11}-\text{NH}-)_n$, and this polyamide can be obtained by polymerizing 12-aminododecanoic acid or dodecanelactam.

The (C) polyamide 6 ~~for use in the present invention~~ is representatively a polyamide having an acid amide bond (-CONH-), represented by the formula: $(-\text{CO}-(\text{CH}_2)_5-\text{NH}-)_n$, and this polyamide can be obtained by polymerizing ϵ -caprolactam or 6-aminocaproic acid.

Kindly replace paragraph [0021] with the following:

The (A) polyamide 11 and/or polyamide 12 and the (C) polyamide 6 ~~for use in the present invention~~ each may be a homopolymer, a mixture with the above-described copolymer, or a mixture with other polyamide-based resins or other thermoplastic resins. In the mixture, the content of the polyamide 11 and/or polyamide 12 or polyamide 6 is preferably 60 wt% or more.

Kindly replace paragraph [0039] with the following:

The molecular structure of the aromatic vinyl compound/conjugated diene block copolymer or a hydrogenated product thereof may be linear, branched or radial or may be an arbitrary combination thereof. Among these, as the aromatic vinyl compound/conjugated diene block copolymer and/or a hydrogenated product thereof ~~for use in the present invention~~, a diblock copolymer where

one aromatic vinyl compound polymer block and one conjugated diene polymer block are linearly bonded, a triblock copolymer where three polymer blocks are linearly bonded in the order of aromatic vinyl compound polymer block-conjugated diene polymer block-aromatic vinyl compound polymer block, and a hydrogenated product thereof are preferably used individually or in combination of two or more thereof. Examples thereof include an unhydrogenated or hydrogenated styrene/butadiene copolymer, an unhydrogenated or hydrogenated styrene/isoprene copolymer, an unhydrogenated or hydrogenated styrene/isoprene/styrene copolymer, an unhydrogenated or hydrogenated styrene/butadiene/styrene copolymer, and an unhydrogenated or hydrogenated styrene/(isoprene/butadiene)/styrene copolymer.

Kindly replace paragraph [0043] with the following:

In the (A) polyamide 11 and/or polyamide 12 and (C) polyamide 6 ~~for use in the present invention~~, an antioxidant, a heat stabilizer, an ultraviolet absorbent, a light stabilizer, a lubricant, an inorganic filler, an antistatic agent, a flame retardant, a crystallization accelerator and the like may be further added, if desired.

Kindly replace paragraph [0046] with the following:

The (B) polyamide ~~for use in the present invention~~ is a polyamide consisting of a dicarboxylic acid unit comprising a naphthalene dicarboxylic acid unit in a proportion of 50 mol% or more based on all dicarboxylic acid units and a diamine unit comprising a 1,9-nonanediamine and/or 2-methyl-1,8-octanediamine unit in a proportion of 60 mol% or more based on all diamine units (hereinafter, this polyamide is sometimes simply referred to as polyamide 9N).

Kindly replace paragraph [0051] with the following:

The diamine unit of the (B) polyamide 9N may contain other diamine unit except for the unit comprising 1,9-nonanediamine and 2-methyl-1,8-octanediamine, within the range of not impairing

various excellent properties of the multilayer structure ~~of the present invention~~. Examples of the other diamine unit include units derived from an aliphatic diamine such as ethylenediamine, propylenediamine, 1,4-butanediamine, 1,6-hexanediamine, 1,8-octanediamine, 1,10-decanediamine, 1,12-dodecanediamine, 3-methyl-1,5-pentanediamine, 2,2,4/2,4,4-trimethyl-1,6-hexanediamine and 5-methyl-1,9-nonanediamine; an alicyclic diamine such as 1,3/1,4-cyclohexanediamine, 1,3/1,4-cyclohexanedimethylamine, bis(4-aminocyclohexyl)methane, bis(4-aminocyclohexyl)propane, bis(3-methyl-4-aminocyclohexyl)methane, bis(3-methyl-4-aminocyclohexyl)propane, 5-amino-2,2,4-trimethyl-1-cyclopentanemethylamine, 5-amino-1,3,3-trimethylcyclohexanemethylamine, bis(amino-propyl)piperazine, bis(aminoethyl)piperazine, norbornanedimethylamine and tricyclodecane-dimethylamine; and an aromatic diamine such as p-phenylenediamine, m-phenylenediamine, p-xylylenediamine, m-xylylenediamine, 4,4'-diaminodiphenylmethane, 4,4'-diaminodiphenylsulfone, 4,4'-diaminodiphenyl ether. These diamine units may be used individually or in combination of two or more thereof. The content of this other diamine unit is preferably 40 mol% or less, more preferably 25 mol% or less, still more preferably 10 mol% or less.

Kindly replace paragraphs [0057] through [0058] with the following:

The (B) polyamide 9N ~~for use in the present invention~~ can be produced by a polyamide polymerization method known as a method for producing a crystalline polyamide. The production apparatus may be a known polyamide production apparatus such as a batch-system reactor, a one-bath or a multi-bath continuous reaction apparatus, a tubular continuous reaction apparatus and a kneading reaction extruder (e.g., a single-screw extruder and a twin-screw extruder). The production of this polyamide can be performed by using a known polymerization method such as melt polymerization, solution polymerization or solid phase polymerization, and repeating the operation under

atmospheric pressure, a reduced pressure or an elevated pressure. These polymerization methods may be used individually or in an appropriate combination.

The (B) polyamide 9N ~~for use in the present invention~~ preferably has a relative viscosity of 1.5 to 4.0, more preferably from 1.8 to 3.5, still more preferably from 2.0 to 3.0, as measured according to JIS K-6920. If the relative viscosity is less than this range, the obtained multilayer structure may have insufficient mechanical properties, whereas if it exceeds the above-described range, the extrusion pressure or torque becomes excessively high and this sometimes makes it difficult to produce a multilayer structure.

Kindly replace paragraph [0062] with the following:

The multilayer structure ~~of the present invention~~ comprises at least two or more layers including a layer (a) comprising (A) polyamide 11 and/or polyamide 12, and a layer (b) comprising (B) a polyamide (polyamide 9N) consisting of a dicarboxylic acid unit comprising a naphthalene-dicarboxylic acid unit in a proportion of 50 mol% or more based on all dicarboxylic acid units and a diamine unit comprising a 1,9-nonanediamine and/or 2-methyl-1,8-octanediamine unit in a proportion of 60 mol% or more based on all diamine units.

Kindly replace paragraph [0068] with the following:

The electrically conducting filler ~~as used in the present invention~~ includes all fillers added for imparting electrically conducting performance to a resin, and examples thereof include particulate, flaked or fibrous fillers.

Kindly replace paragraphs [0075] through [0076] with the following:

In the multilayer structure ~~of the present invention~~, the thickness of each layer is not particularly limited and can be controlled according to the kind of the polymer constituting each layer, the number of layers in the entire multilayer structure, the use application and the like. However, the

thickness of each layer is determined by taking into account the properties of the multilayer structure, such as alcohol gasoline permeation-preventing property, low-temperature impact resistance and flexibility. In general, the thickness of each of the layers (a), (b) and (c) is preferably from 3 to 90% of the entire thickness of the multilayer structure and, in view of the alcohol gasoline permeation-preventing property, the thickness of the layer (b) is more preferably from 5 to 80%, still more preferably from 10 to 50%, of the entire thickness of the multilayer structure.

The total number of layers in the multilayer structure ~~of the present invention~~ is not particularly limited and may be any number as long as the multilayer structure comprises at least two layers including a layer (a) comprising (A) polyamide 11 and/or polyamide 12 and a layer (b) comprising (B) polyamide 9N, preferably at least three or more layers including a layer (a) comprising (A) polyamide 11 and/or polyamide 12, a layer (b) comprising (B) polyamide 9N and a layer (c) comprising (A) polyamide 11 and/or polyamide 12 or (C) polyamide 6. In the multilayer structure of the present invention, one or more layer comprising other thermoplastic resin may be provided in addition to those three layers (a), (b) and (c) so as to impart an additional function or obtain a multilayer structure advantageous in view of profitability.

Kindly replace paragraphs [0080] through [0082] with the following:

The number of layers in the multilayer structure ~~of the present invention~~ is 2 or more, but in view of mechanism of the multilayer structure producing apparatus, the number of layers is 7 or less, preferably from 2 to 6, more preferably from 3 to 5. Fig. 1 shows a three-layered laminate. In the case of a two-layered laminate, the layer (c) is not present, and in the case of a laminate of three or more layers, the layers other than the layers (a) and (b) may be arbitrary layers as described above.

The multilayer structure ~~of the present invention~~ can be produced into various shapes such as film, sheet, tube and hose, by using a commonly employed thermoplastic resin molding machine

such as extrusion molding machine, blow molding machine, compression molding machine and injection molding machine. In this production, an arbitrary melt molding method including a co-extrusion molding method (e.g., T-die extrusion, inflation extrusion, blow molding, profile extrusion, extrusion coating) and a multilayer injection molding method may be used.

The multilayer shaped article comprising the multilayer structure of the present invention is used as automobile parts, industrial materials, industrial supplies, electrical and electronic parts, machine parts, office equipment parts, household articles, containers, sheets, films, fibers and other various shaped articles having any purpose and any shape. Specific examples thereof include a fuel pipe tube or a hose for automobiles, an automobile radiator hose, a brake hose, an air conditioner hose, a tube such as electric wire covering material and optical fiber covering material, hoses, an agricultural film, a lining, a building interior material (e.g., wallpaper), a film of laminate steel sheet or the like, sheets, an automobile radiator tank, a liquid chemical bottle, a liquid chemical tank, a bag, a liquid chemical container, and tanks such as gasoline tank. In particular, the shaped article is useful as a fuel pipe tube or a hose for an automobile.

Kindly replace paragraph [0089] with the following:

EXAMPLES

The ~~present invention~~ multilayer structure is described in greater detail below by referring to Examples and Comparative Examples, but the present invention is not limited thereto.

Kindly replace paragraph [0119] with the following:

INDUSTRIAL APPLICABILITY

The multilayer structure of the present invention is excellent in the heat resistance, chemical resistance, low-temperature impact resistance, alcohol gasoline permeation-preventing properties and interlayer adhesion. Accordingly, the multilayer structure of the present invention is effective as a

film, hose, tube, bottle or tank for use in automobile parts, industrial materials, industrial supplies, electrical and electronic parts, machine parts, office equipment parts, household articles and containers. The multilayer structure of the present invention is particularly useful as a fuel pipe tube or hose for an automobile.